

Evaluation of Ground Rupture Effect on Buried HDPE Pipelines

By

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ABSTRACT

A comprehensive experimental study was carried out to investigate the effect of seismic ground rupture on buried HDPE pipelines using centrifuge modeling as a main tool. Centrifuge tests were conducted using an advanced split-container on Rensselaer 150 g-ton geotechnical centrifuge. Important parameters which influence the effect of ground rupture on buried pipelines, such as: 1) fault-pipe orientation, 2) faulting direction, 3) fault offset rate, 4) soil moisture content and 5) pipe diameter and burial depth to pipe diameter (H/D) ratio, are investigated. The relationships between soil-pipe interaction force and relative soil-pipe deformations (i.e. p-y relationships) were developed using the experimental data. Comparisons were made between the results from experimental tests and results from analytical calculations using the commonly used Kennedy model. Comparisons were also made between centrifuge test results and results from Cornell University full scale tests. Recommendations for both engineering practice and future research were provided.